

EXPRESS MAILING LABEL NO. EU008176286US

ARTICLE ENGAGABLE UNIT SELECTIVE POSITIONING

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Field of the Invention

This invention relates to article positioning and/or conveying, and, more particularly, relates to selective
5 positioning of an article engagable unit along an
engaging path for positioning and/or conveyance of
articles.

Background of the Invention

It is oftentimes necessary to position and/or convey
10 articles having side portions, such as, for example,
containers or packages.

It is well known that such articles may be conveyed
using belts and/or air in conjunction with guides or the
like establishing and maintaining an article path (see,
15 for example, U.S. Patent Nos. 5,320,457 (VanderMeer et
al.) and 5,372,472 (Winski et al.)).

Likewise, it is well known that such articles may be
positioned (including while being conveyed) using, for
example, pushers or guides to urge the articles a
20 predetermined distance or into a then needed pattern
(see, for example, U.S. Patent Nos. 4,934,508 (VanderMeer
et al.), 5,320,478 (Gonsowski et al.), and 5,372,472
(Winski et al.)).

Also, it is now known that guides or the like can be provided at a fixed position with respect to an article path (see, for example, U.S. Patent Nos. 5,028,174 (Karass) and 6,190,094 (Rediess et al.)) or may be
5 adjusted with respect to an article path (see, for example, (U.S. Patent Nos. 5,161,919 (Smith et al.) and 6,293,736 (Farquhar)).

It is often desirable, however, and in some cases necessary, that article engagable elements, such as
10 guides or pushers, have a capability for quick and reliable movement different distances depending upon the particular containers or packages to be then positioned and/or conveyed.

Summary of the Invention

15 This invention provides a device and method for selective positioning of an article engagable unit along an engaging path, including positioning of articles and/or facilitating conveyance of articles along an article path, with the device being reliable and capable
20 of rapid adjustment between set positions along an engaging path, as well as being relatively simple and inexpensive.

The positioning device for the article engagable unit includes a mounting unit and a relatively movable unit, now preferably including a slider having an actuator and an article engagable unit connector as specifically shown and described herein, for positioning the article engagable unit along an engaging path.

A mechanical unit capable of establishing a plurality of set positions for the article engagable unit along the engaging path is used in conjunction with the movable unit to enable positioning of the article engagable unit at any of the plurality of set positions along the engaging path.

The mechanical unit includes first and second movable portions, now preferably a ratchet wheel and a shaped wheel constrained to common movement as specifically shown and described herein, with the first movable portion being engagable with the actuator on the movable unit and the second movable portion providing a plurality of stops, or movable stops, for establishing the plurality of set positions for the article engagable unit.

In operation, a force unit, now preferably a pneumatic unit as specifically shown and described herein, causes the movable unit to be driven in a first

direction so that the actuator on the movable unit
actuates the first movable portion of the mechanical unit
for limited distance movement to thereby cause movement
of the mechanical unit to position one stop of the
5 plurality of stops on the second movable portion of the
mechanical unit at a stop area, and thereafter causes the
movable unit to be moved in a second direction to move
the movable unit to the stop area to engage the stop then
at the stop area to thereby position the article
10 engagable unit at a set position along the engaging path,
with repeated movement of the movable unit, if necessary,
in the first and second directions causing a particular
stop, then needed, to be positioned at the stop area
whereby the article engagable unit can be positioned at
15 any of the plurality of set positions along the engaging
path.

It is therefore an object of this invention to
provide an improved article engagable unit positioning
device and method.

20 It is another object of this invention to provide an
improved device and method for selective positioning of
an article engagable unit along an engaging path for
positioning of articles.

It is another object of this invention to provide an improved device and method for selective positioning of an article engagable unit along an engaging path to facilitate conveyance of articles along an article path.

5 It is another object of this invention to provide a positioning device and method utilizing a mechanical unit for establishing a plurality of set positions for an article engagable unit.

10 It is another object of this invention to provide a positioning device having a mechanical unit operating in conjunction with a movable unit for establishing and selecting a set position for an article engagable unit.

15 It is another object of this invention to provide a positioning device having a movable unit with an actuator and an article engagable unit connected therewith operated in conjunction with a mechanical unit having a first movable portion engagable with the actuator and a second movable portion with stops thereon to establish a plurality of set positions for the article engagable unit
20 along an engaging path with selection of a particular one of the plurality of set positions causing the article engagable unit to be positioned at a then needed set position along the engaging path for positioning and/or conveyance of articles.

With these and other objects in view, which will become apparent to one skilled in the art as the description proceeds, this invention resides in the novel construction, combination, arrangement of parts, and method substantially as hereinafter described, and more particularly defined by the appended claims, it being understood that changes in the precise embodiments of the herein disclosed invention are meant to be included as come within the scope of the claims.

Brief Description of the Drawings

The accompanying drawings illustrate complete embodiments of the invention according to the best mode so far devised for the practical application of the principles thereof, and in which:

FIGURE 1 is a first perspective view of the positioning device of this invention illustrated having an article engagable unit connected therewith;

FIGURE 2 is a second perspective view of the positioning device as shown in FIGURE 1;

FIGURE 3 is a perspective view like that of FIGURE 1 but having portions cut-away;

FIGURE 4 is a third perspective view of the positioning device as shown in FIGURES 1 and 3 but having portions cut-away;

FIGURE 5 illustrates, in perspective, a pair of positioning devices positioned at opposite sides of an article path; and

FIGURE 6 is a simplified block diagram illustrating air control to the air cylinder of the pneumatic unit shown in FIGURES 1 through 5.

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Description of the Invention

Article engagable unit positioning device, or positioner, 7 of this invention may be utilized to position or guide conveyed articles having an engagable side portion, with such articles including, by way of example, containers or packages, such as bottles, boxes, cartons, or cases (including fully or partially packaged containers or packages). In addition, the article (or articles) may be positioned, or repositioned, at one location, or may be positioned to facilitate conveyance of the article (or articles) along an article path.

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As shown in FIGURES 1 through 5, article engagable unit positioning device 7 includes a first, or mounting,

unit 9 having sides 10 and 11, top and bottom walls 12 and 13, and front and back walls 14 and 15.

As indicated in FIGURES 1, 2, and 5, mounting unit 9 includes threaded mounting posts 16 to enable fastening
5 of the mounting unit to a frame.

As particularly illustrated in FIGURE 5, positioner 7 is positioned, by way of specific example, adjacent to article path 18 (article path 18 has a middle 19 and varies in width depending upon the articles to be
10 conveyed along the article path).

By fastening positioner 7 to a frame that also has article supporting and/or conveying apparatus (establishing article path 18) also mounted thereon, a known relationship between the positioner and the article
15 path is thereby established in the same manner as is established, for example, in above-cited prior art references between side guides and supporting and/or conveying apparatus.

Second, or movable, unit 20 of article engagable
20 unit positioning device 7 includes, as best shown in FIGURES 1, 2, and 5, a slider 21 with arms 22 movably mounted in notches 23 in side walls 10 and 11 of the mounting unit so that the slider can move in opposite directions toward and away from mounting unit 9 (and

toward and away from the middle of article path 18 as specifically indicated in FIGURE 5).

Slider 21 also has a front block, or plate, 25 and arm 26 (fastened to front block 25 by bolts 27) that
5 extends rearwardly into mounting unit 9.

As shown in FIGURES 3 and 4, arm 26 has an actuator 28 (a pawl as indicated) thereon and block 25 has a connector, or connector portion, 29 at the front thereof so that the slider can be connected with article
10 engagable unit 30 (by means of bolt 31 in FIGURES 1, 3, and 5) for selective positioning of article engagable unit 30 along engaging path 32 (article engagable unit 30 is specifically illustrated in FIGURE 5 as an article guide, or article engagable guide, selectively positioned
15 along a guide path as engaging path 32).

As particularly indicated in FIGURE 5, article guide 30 may extend along and adjacent to article path 18 with the set positions of article guide 30 along angularly oriented (substantially perpendicular as indicated in
20 FIGURE 5) guide path 32, with respect to article path 18, so that the movement of the guide along the guide path is toward and away from the mounting unit to thereby decrease or increase the width of article path 18.

Force unit 33, now preferably a pneumatic unit as indicated in the drawings, has air cylinder 34 mounted on side 11 of the mounting unit with cylinder rod 35 extending in a forward direction from the cylinder.

5 As shown, rod 35 is connected with movable unit 20 and, more particularly, is connected with connector 29 of slider 21 and article engagable unit 30 (using nuts 36 as indicated in FIGURES 1 through 5) so that the movable unit is caused to be moved in first and second opposite
10 directions toward and away from engagable articles (and thus away from and toward the mounting unit) by introduction of air into rear port 37 to cause rod 35 to be extended to effect movement of the movable unit in a first direction away from the movable unit and toward
15 engagable articles (i.e., toward the middle of article path 18 as specifically illustrated in FIGURE 5), or into front port 38 to cause rod 35 to be retracted to effect movement of the movable unit in a second direction toward the mounting unit and away from engagable articles (i.e.,
20 away from the middle of article path 18 as specifically illustrated in FIGURE 5).

Mechanical unit 40 is mounted on side 10 of mounting unit 9 and, as indicated in FIGURES 3 and 4, has first and second movable portions 41 and 42 constrained to

common movement with respect to one another (as specifically illustrated in FIGURES 3 and 4, and as now preferred, first movable portion 41 is a ratchet wheel having shaped teeth 43 and second movable portion 42 is a shaped wheel with both wheels being fixed to pivot pin 44 for common rotation).

As also indicated in FIGURES 3 and 4, ratchet wheel 41 is engagable with pawl 28 to cause limited rotation of the ratchet wheel (i.e., the ratchet wheel is rotated a limited distance upon each actuation by the pawl during movement of the pawl in a first, or forward, direction away from the mounting unit (i.e., toward the middle portion of article path 18 as specifically illustrated in FIGURE 5) with shaped teeth 43 of the ratchet wheel assuring that a uniform distance is traveled during each actuation by the pawl.

Shaped wheel 42 has a plurality of movable stops 46 (stops 46a, 46b, 46c, 46d, and 46e as indicated in FIGURES 3 and 4) each of which can be successively positioned at stop, or block, area 47 (i.e., a different stop is positioned at stop area 47 upon each actuation of the ratchet wheel and the shaped wheel (stop 46e is illustrated in FIGURES 3 and 4 as the stop then at stop area 47).

With respect to the stops at the periphery of the shaped wheel as indicated in FIGURES 3 and 4, stop 46a is positioned at stop area 47 when cylinder rod 35 is most retracted to establish a set position with the article
5 engagable unit extending the least distance from the mounting unit (i.e., the greatest distance from the middle of article path 18 as specifically illustrated in FIGURE 5), stops 46b, 46c, and 46d are successively positioned at stop area 47 when cylinder rod 35 is
10 progressively more extended so that the established set positions are at greater distances from the mounting unit (i.e., at lesser distances from the middle of article path 18 as specifically illustrated in FIGURE 5), and stop 46e is positioned at stop area 47 with the greatest
15 extension of cylinder rod 35 to establish a set position at the greatest distance from the mounting unit (i.e., at the least distance from the middle of article path 18 as specifically illustrated in FIGURE 5).

Cylinder rod 35 when moved to maximum extension
20 during movement of the slider in the first direction to actuate the ratchet wheel is further extended than extension of the rod when positioned with stop 46e at the stop area.

Movement of slider 21 in a second, or rearward,
direction toward the mounting unit (i.e., away from
article path 18 as specifically illustrated in FIGURE 5)
causes the pawl to be moved past the ratchet wheel
5 without causing rotation of the ratchet wheel, and then
causes rear edge 48 of front block 25 of the slider to be
positioned at the stop area in engagement with the stop
on the shaped wheel then positioned at the stop area to
thereby establish a set position for the article
10 engagable unit along the engaging path.

For selection of a then needed stop 46 to establish
a then needed set position for the article engagable unit
along the engaging path (unless that stop is then at the
stop area), pawl 28 is repeatedly moved into engagement
15 with ratchet wheel 41 (by moving slider 21 in the forward
direction to engage and rotate the ratchet wheel a
limited distance, after which the slider is moved in the
rearward direction past the ratchet wheel before being
moved in the forward direction to again engage the
20 ratchet wheel).

Each actuation of the ratchet wheel rotates the
ratchet wheel and shaped wheel a limited distance to
thereby position successive ones of stops 46 at stop area
47 until the then needed stop is positioned at the stop

area to thereby establish the then needed set position
for the article engagable unit along the engaging path.
Thus, any one of the plurality of set positions can be
established for the article engagable unit along the
5 engaging path.

Stops 46 on shaped wheel 42 are selected and formed
at the periphery of the shaped wheel in view of known
particular distances the article engagable unit needs to
be moved to position particular articles (such as
10 containers or packages of different size) and/or needs to
be spaced to provide a sufficiently sized article path
(an article path, for example, of sufficient width
between positioners at opposite sides of the article
path, as specifically illustrated in FIGURE 5, as is then
15 needed for articles to be then conveyed along the article
path).

While five stops are illustrated in FIGURES 3 and 4,
the number of stops can be varied as needed (up to about
seven or eight stops being now considered as practical).

20 Like positioners 7 may be positioned at opposite
sides of article path 18, as is specifically illustrated
in FIGURE 5, and like positioners 7 may likewise be
positioned at different locations along the articles or

the article path (at one side, or at both sides, of the articles or the article path).

Control unit 49 is preferably used to control operation of the positioning device by controlling
5 operation of the force unit to cause movement of the movable unit in the first and second opposite directions.

As particularly indicated in FIGURE 6, control unit 49 may be implemented for use in connection with a pneumatic unit by switching unit 50 (such as, for
10 example, using a programmed computer or simply a manual push button switch) controlling operation of solenoid actuated air controller 51 to cause air from air supply 52 to be introduced through air source inlet 53 to either rear port 37 or front port 38 of air cylinder 34 (with
15 the other of ports 37 and 38 being then connected with open, or return, outlet port 54 for air discharge from the cylinder) to cause cylinder rod 35 to be extended or retracted thereby causing movement of the movable unit in the first or second direction.

20 As can be appreciated from the foregoing, this invention provides an improved device and method for selective positioning of an article engagable unit along an engaging path.